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CE 431-102: Construction Materials Laboratory

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New Jersey Institute of Technology
Department of Civil & Environmental Engineering

CE 431 – Construction Materials Laboratory

Text Required: No

Instructor: Patrick J. Granitzki, PE

Email: pjg7@njit.edu

Office Hours: Prior to or after class by appointment

Prerequisite(s): Mech 237, CE 210

*“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

<http://www5.njit.edu/policies/sites/policies/files/academicintegritycode.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

Course Description: This course provides an understanding of the basic properties of construction materials, and presents current field, laboratory standards and requirements for these materials. Students select a material or component assembly for testing, design a testing procedure, and present their results.

Week	Topic	Assignment Due	Reference
1	Introduction, Safety, Portland Cement Concrete (PCC) Mix Design		ACI 211, ASTM C125
2	PCC Batch and Test Mix, Slump, Air, Cylinder Preparation	Concrete Mix Design Add name to group on Canvas	ASTM C192, ASTM C31, ASTM C143, ASTM C231, ASTM C173, ASTM 172, ASTM 94, ASTM C138
3	Concrete Cylinder Testing (7 Day Test)	Concrete Mix Laboratory Sheet	ASTM C39, ASTM C496, ASTM C805

4	Construction Vibrations, Noise Measurements, Moisture, Light, Gas	Concrete 7 Day Lab Sheet	Handout
5	Asphaltic Concrete,	7 Day Concrete Laboratory Report	Handout
6	Concrete Cylinder Testing (28 Day), Windsor Probe, Concrete Hammer, Indirect Tension	Asphalt Homework (Individual)	ASTM C39, ASTM C805, ASTM C803, ASTM C496, ASTM C469
7	Introduction to Welding & Epoxy Testing	28 day Concrete Lab Report (Group)	
8	Anchor Pullout Testing	Welding and Epoxy Lab Report (Group)	ANSI/AWSP1.1
9	Student Design Lab – Topic, Research and Testing Proposal	Anchor Pull Out Lab/Assignment	
10	Strain Gauge	Student Design lab Topic	Handout, ASTM D897
11	Student Design Lab	Strain Gauge Lab Sheet (Individual)	
12	Student Design Lab		Handout
13	Presentation of Results of Student Testing	Student Design Lab Report & Presentation (Group)	

Note: Students will be consulted on any substantial changes to the course syllabus. Changes will be discussed and announced in advance.

Basis of Grading: Homework= 15% Laboratory Reports = 50%, Final Project = 30%, Class Participation = 5%. All work performed in class is expected to be college level work.

Late Submissions: One individual assignment can be submitted late without penalty. Late assignments one day late is 10% in penalty and two days late is 20% off. After two days not accepted, unless discussed with the professor due to an extenuating circumstance prior to the homework/report due date. **Late submissions must be uploaded to moodle and handed in in the next class as a paper copy.**

Honor Code: Students are advised that the NJIT Honor Code will be upheld in this course, and any violations will be brought to the immediate attention of the Dean of students.

Laboratory Introduction:

Welcome to the CEE Construction materials laboratory. This is a place where you will “put to the test” the theory you are learning in the classroom. The Construction Materials Laboratory Course (CE 431) is designed to complement the lecture portions of four

construction/structures oriented courses: Construction Method and Procedures (CE 210), Construction Engineering (CE 414), Concrete Design (CE 333) and Steel design (CE 432). The specific objectives of this course are to provide the student with an opportunity to:

1. Investigate the properties and behavior of materials and assemblies;
2. Become familiar with ASTM specifications and testing procedures and with construction field monitoring and testing practices;
3. Develop skills for analyzing experimental data and working in teams;
4. Learning to design, conduct and analyze data of custom student designed laboratory experiments; and
5. Research and cite referenced standards.

Most of the experiments are performed by a student group of four to five people. The experiments are interactive and involve the following

- | | |
|----------------|-------------------|
| 1. Setup | 4. Adjustment |
| 2. Operation | 5. Data Gathering |
| 3. Measurement | 6. Data Reduction |

The group approach teaches the value of teamwork in problem solving during the laboratory period and after class as data is exchanged and reduced. Some experiments are performed as class demonstrations in which each group is assigned a single set to analyze. Later towards the end of the period, the group reports their results to form a collective body of data.

Students will have the opportunity to design and conduct their own custom laboratory experiment. It will be both an interesting and challenging experience, since they must translate a stated problem into physical experiment, research and cite standards, testing procedures and expected results, making decisions on set up, experimental parameters, analysis methods, report and present their findings. This experiment will require students to apply the various experimental techniques that they have learned throughout the semester.

Written assignments must be submitted for each laboratory experiment. Most laboratory reports will be written and submitted individually by students. In completing individual reports, students in the same group will share data, although all analysis and written text must be the student's own work. A few group-written reports will be assigned during the semester. For some experiments, an abbreviated lab format will be submitted.

Your safety and the safety of those around you are of prime importance. Efforts have been made to reduce the hazards in the laboratory as much as possible. Students should follow the general safety rules included on the following page. If you see anything you consider to be a safety hazard report this condition to the laboratory instructor. If you have any questions about laboratory safety of the laboratory test you are going to conduct, consult the laboratory instructor. Take your experiments seriously.

Forces in the thousands of pounds will be used throughout this course and if these forces are released in an uncontrolled manner injuries are possible. Good Luck with your experiments!